ARCS

Remedial Planning Activities at Selected
Uncontrolled Hazardous Substance Disposal
Sites in the Zone of Regions IX and X

100 PERCENT FINAL PIPELINE DESIGN SUBMITTAL
NEWMARK OU REMEDIAL DESIGN
NEWMARK GROUNDWATER CONTAMINATION
SUPERFUND SITE NORTH PLANT

U.S. Environmental Protection Agency
Contract No. 68-W9-0054

URS Greiner

Team Subcontractors:

Black & Veatch Special Projects Corp.
Shannon and Wilson, Inc.

URS Greiner

URS Greiner, Inc.
2710 Gateway Oaks Drive
Suite 250 North
Sacramento, California 95833
Telephone (916) 929-2346
Facsimile (916) 929-7263
Offices in Principal Cities Nationwide

September 26, 1997

Mr. Roy Herzig (SFD-7-4)
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

62370.50.41.0138
06.g3

Subject: **Contract No. 68-W9-0054 / WA No. 54-37-9NJ5**
Newmark Operable Unit (OU) Remedial Design (RD)
Newmark Groundwater Contamination Superfund Site
Final North Plant 100 Percent Pipeline Design Submittal

Dear Mr. Herzig:

Enclosed is two copies of the Final Newmark North 100 Percent Pipeline Design Submittal for the Newmark Operable Unit (OU) Remedial Design (RD) work assignment. All comments on the earlier version of the North Design submittal have been incorporated.

Thank you for the opportunity to provide EPA with remedial efforts on the Newmark Plume OU. If you have any questions, please do not hesitate to call me at (916) 929-2346.

Sincerely,

URS CONSULTANTS, INC.

Dwayne H. Deutscher, P.E.
Site Manager

DHD/mam

Enclosure

cc: M. Morkowski, EPA Region IX (SFD-4), w/o encl.
D. Katzki, EPA Region IX (PMD-8), w/o encl.
P. Garcia, DTSC
C. Baliga, DHS
K. Saremi, RWQCB-Santa Ana Region
J. Headlee, ACOE
S. Fuller, SBVMWD
M. Lowe, City of San Bernardino
J. Dye, City of San Bernardino
B. Appel, URSG Sac., w/o encl.
P. Schultz, URSG Sac.
J. Stejskal, City of San Bernardino
Project and Chron Files

(62370-J/B:\NONMK100.FIN)

100 PERCENT FINAL PIPELINE DESIGN SUBMITTAL
NEWMARK OU REMEDIAL DESIGN
NEWMARK GROUNDWATER CONTAMINATION
SUPERFUND SITE NORTH PLANT

Prepared For:

Contract No. 68-W9-0054 / WA No. 54-37-9NJ5
U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, CA 94105

Prepared By:

URS Consultants, Inc.
2710 Gateway Oaks Drive, Suite 250N
Sacramento, CA 95833

September 26, 1997

IDENTIFICATION FORM

Document Title:	**FINAL 100 PERCENT PIPELINE DESIGN SUBMITTAL NEWMARK OU REMEDIAL DESIGN NEWMARK GROUNDWATER CONTAMINATION SUPERFUND SITE NORTH PLANT**
Site Location:	San Bernardino, California
Work Assignment No.:	53-37-9NJ5
Document Control No.:	62370.50.41.0092
Organization Title: Address:	URS Consultants, Inc. 2710 Gateway Oaks Drive, Suite 250 North Sacramento, California 95833
Responsible Official: Title: Telephone:	Bruce D. Appel Program Manager, ARCS, EPA Regions IX & X (619) 929-2346
Site Manager: Address: Telephone:	Dwayne H. Deutscher, P.E. URS Consultants, Inc. 2710 Gateway Oaks Drive, Suite 250 North Sacramento, California 95833 (619) 929-2346
Plan Coverage:	This document constitutes the 100 Percent North Pipeline Design Submittal for the Newmark Operable Unit Remedial Design, Newmark Groundwater Contamination Superfund Site Work Assignment (WA) in the U.S. Environmental Protection Agency's (EPA) Region IX under EPA Contract No. 68-W9-0054. These services are provided by URS Consultants, Inc. as prime contractor.

APPROVAL FORM

Prepared for: U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

Prepared by: URS Consultants, Inc.
2710 Gateway Oaks Drive, Suite 250N
Sacramento, CA 95833

Approved by:

Signature: _____ Date: 9/26/97
Name: Dwayne H. Deutscher, P.E.
Title: Site Manager
Engineering Manager

Signature: _____ Date: 9/26/97
Name: Bruce D. Appel
Title: Program Manager

This document has been prepared for EPA under the Alternative Remedial Contracts Strategy (ARCS) Contract No. 68-W9-0054. The material contained herein is not to be disclosed to, discussed with, or made available to any person or persons for any reason without prior express approval of a responsible officer of EPA.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd.)

LIST OF APPENDICES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

ASTM	American Society of Testing and Materials
Caltrans	California Department of Transportation
City	City of San Bernardino
DHS-DDWEM	Department of Health Services - Division of Drinking Water and Environmental Management
DIP	Ductile iron pipe
EA	Each
fps	Feet per second
ft/1,000 ft	Feet per 1,000 feet
gpm	Gallons per minute
LF	Lineal feet
LS	Lump sum
MCL	Maximum contaminant level
O.D.	Outside diameter
O&M	Operation and maintenance
OU	Operable unit
PCE	Tetrachloroethene
psi	Pounds per square inch
SBCFCD	San Bernardino County Flood Control District
SBMWD	San Bernardino Municipal Water Department
TCE	Trichloroethene
URS	URS Consultants, Inc.
USEPA	U.S. Environmental Protection Agency
WA	Work assignment

1.0 INTRODUCTION

This 100 Percent Design Submittal presents design basis and concepts developed for the pipeline system required to convey raw water from extraction wells to the groundwater treatment system at the North Plant, Newmark Operable Unit (OU), San Bernardino, California. Drawings and technical specifications are presented in a separate document titled "Final 100 Percent Construction Plans and Specifications, Newmark Groundwater Contamination Superfund Site, North Plant Pipeline." The design is being prepared by URS Consultants, Inc. (URS) under United States Environmental Protection Agency (USEPA) Contract No. 68-W9-0054/Work Assignment (WA) No. 54-37-9NJ5.

This 100 percent design submittal incorporates and finalizes comments on the 60 percent design submittal received from the City of San Bernardino (City), the USEPA, and the San Bernardino County Flood Control District. Well locations have been determined and the two new wells have been drilled. Pipeline connection points to City-installed site piping have been coordinated with the City. Electrical conduit in accordance with Southern California Edison requirements has been added beneath the Flood Control channel to provide power to Extraction Well No. 2.

The design of the groundwater extraction and treatment systems is divided into two major design projects:

- Water transmission pipeline design.
- Groundwater treatment system design.

The design of the groundwater treatment systems was initiated before start of the transmission pipeline design because of the time required to obtain pipeline route survey information (URS 1995b). This package covers the design of the water transmission pipeline for the North Plant. Separate deliverables are being submitted for transmission pipeline and groundwater treatment system designs. The design for reconstruction of the Moose Lodge area impacted by construction of the well and transmission pipeline is also enclosed.

1.1 BACKGROUND

The California Department of Health Services - Division of Drinking Water and Environmental Management (DHS-DDWEM) discovered chlorinated solvents in municipal water-supply wells (municipal wells) within the north San Bernardino/Muscoy region of San Bernardino County during a 1980 groundwater investigation. Several investigations were conducted to locate the potential source(s) of contamination. On March 30, 1989, USEPA placed this region on the National Priorities List, thereby releasing federal funds for cleanup of the region, now identified as the Newmark Groundwater Contamination Superfund Site (site).

The principal contaminants identified in site investigations were trichloroethene (TCE) and tetrachloroethane (PCE). Reported concentrations of these contaminants exceed federal and California maximum contaminant levels (MCLs) for drinking water in several municipal wells within the San Bernardino and Muscoy areas, including the Newmark Municipal Wellfield (Newmark Wellfield).

1.2 DESIGN OBJECTIVE

1.2.1 Intercept Plume Migration

The goal of this project is to intercept further migration of the Newmark groundwater contaminant plume. The proposed extraction well system, from which this pipeline will convey water to the North Treatment Plant, is located along Western Avenue between Kendall Drive and 48th Street. Preliminary well locations, well numbers, and pumping rates are contained in the report "Newmark Wellhead Extraction System Technical Memorandum -- Newmark Operable Unit Remedial Design" (URS 1995a).

1.2.2 Minimize Community Disruption

The construction of a buried pipeline in public streets and adjacent to residential areas will necessarily cause some inconvenience for local residents. To minimize these inconveniences, the following requirements will be invoked: (1) construction activities will be limited to the hours of 7:00 a.m. to 7:00 p.m. except when extenuating circumstances require work be performed beyond these hours; (2) all roadway lanes will be made passable at the end of each day by backfilling or steel sheeting the trench; (3) if necessary, as may be required for 48th Street, the entire street will be closed as construction passes across the street. 48th Street is a school bus route. The school district will be advised before the onset of construction. Also, any proposed street closing will be coordinated with the City Public Works Department and properly posted prior to the street closing.

1.2.3 Agency and Water Purveyor Requirements

The pipeline will be designed in accordance with San Bernardino Municipal Water Department (SBMWD) standards and applicable State of California DHS-DDWEM requirements. The pipeline design will be reviewed by both agencies.

2.0 PIPELINE DESIGN

2.1 WATER TRANSMISSION PIPELINE ALIGNMENT

Extraction Well No. 1 is located at the northeast corner of the intersection of Kendall Drive and Western Avenue. The site is within a San Bernardino County Flood Control District (SBCFCD) easement adjacent to the Western Avenue Flood Control Channel. (See Sheet No. 3 of the plans.) Extraction Well No. 2, located approximately 600 feet north of well No. 1, is located on property formerly owned by Moose Lodge. Below is a description of the revised pipeline route.

2.1.1 Selected Route

The proposed transmission pipeline alignment is as follows:

- Begin the pipeline at Extraction Well No. 1 and go north in the Western Avenue right-of-way.
- Cross the flood control channel at Extraction Well No. 2 site and interconnect the two new extraction well piping systems to one common transmission pipeline.
- Cross the street at 48th Street, tie into the pipeline from existing Well No. 3, and continue north along the drainage channel east access road to the Newmark Plant.

2.1.2 Utility Impact

One important criterion in the selection of the pipeline route was the impact of the proposed pipeline to existing underground utilities. Western Avenue is a 2-lane secondary street. There is a 15-inch sanitary sewer on the southbound lane between Kendall Drive and 48th Street. Several underground utilities are located at 48th Street. Between 48th Street and the entrance to the Newmark Plant, the SBCFCD access road is unpaved and there is a 12-inch parallel waterline under the road. Since the access road is approximately 20-feet wide and the City has a 40-foot right-of-way easement, there is adequate room for the portion of the proposed transmission pipeline connecting the two new extraction wells. The remainder of the pipeline will be located in easements and County Flood Control Districts access road, which represent the most direct route to the water treatment plant.

2.2 PIPELINE SIZING

The design flow rate for the North Plant from the new extraction wells is 2,300 gallons per minute (gpm). Flow rate from existing Well No. 3 is expected to be in the range of 1,600 gpm. Total flow entering the proposed water treatment plant is therefore 3,900 gpm. The pipeline has been sized to handle these ranges. Two criteria were used in transmission pipeline diameter selection:

1. Velocity. Optimal velocity of water flow is between 3 to 5 fps (feet per second).

2. Head Loss. Desired head loss is under 10 ft/1000 ft (feet per thousand feet).

Following is the expected flow rates, selected pipeline sizes, and pipeline flow characteristics. Assumes Hazen-Williams roughness coefficient C = 120.

Extraction Well No.	Nominal Flow Rate (gpm)	Pipe Size (inches)	Velocity* (fps)	Head Loss* (ft/1,000 ft)
1	1,000	12	2.8	2.8
1 + 2	2,300	16	3.7	3.3
1 + 2 + 3	3,900	16	6.3	8.7

* 10 percent has been added to the nominal flowrate to determine velocity and head loss.

2.3 FLOOD CONTROL CHANNEL CROSSING ALTERNATIVE METHODS

Two pipeline channel crossing methods were investigated. The channel is approximately 7-feet-deep by 31-feet-wide at the top. The slopes are concrete-lined while the bottom is unlined. The two crossing alternatives are:

1. Beneath the channel. The slope walls would be cut, and the channel trenched. The pipe would be encased in concrete beneath the channel.

2. Span the channel. The pipe would be designed to span the entire channel by independently supporting a section of steel pipe on each side of the channel.

Alternative No. 1 was selected based on aesthetics and ease of maintenance. An air release valve will be installed at the high point of the transmission line and a blow-off will be installed at the low point.

2.4 MOOSE LODGE SITE DRAINAGE IMPROVEMENTS

Following construction of the transmission pipeline across the Moose Lodge property, the area adjoining the pipeline will be regraded to improve drainage on the Moose Lodge property. This work will be constructed separately from the pipeline. The design drawing is included in the Final 100% Plans and Specifications volume.

2.5 CONNECTION AT TREATMENT SYSTEM

The transmission pipeline will terminate at the existing 30-inch diameter raw waterline inside the reservoir site.

2.6 BACKWASH PIPELINE

Spent backwash water from the treatment plant is pumped through a 4-inch diameter PVC pipeline at a rate of 200-gpm. The pipe originates at the treatment plant and travels along the east flood control channel to the north side of 48th Street. At that point, pipeline material changes to steel and the pipe is attached to the north side of the existing bridge. The pipeline discharges into an open catch basin utilizing a one-foot air gap to prevent the possibility of a cross connection to the sewer. The catch basin drains through a water trap into an existing sewer manhole located at Western and 48th Street.

2.7 WELL WASTE LINES

During periodic flushing, the well waste lines will convey extracted groundwater to the nearby storm drain channel. Since the wells are not expected to cycle regularly, the transmission pipeline will serve as a common drain line for the wells. By opening and closing three shutoff valves manually, the transmission pipeline will accommodate the respective pumping and wasting cycles of the wells.

2.8 REGULATORY AGENCY REQUIREMENTS

The flood control channel crossing by the transmission pipeline and well waste discharge line will require coordination with the SBCFCD. The City Department of Public Works will review the portion of the pipeline in street right-of-way.

3.0 PIPELINE CONSTRUCTION

3.1 TRENCHING

Trench Width. Maximum trench width for the transmission pipeline will not exceed 30 inches or 1.5 times the outer diameter (O.D.) of the pipe plus 18 inches, whichever is greater. Minimum trench width shall be the O.D. of the pipe plus 12 inches.

Trench Depth. Trench depth will be as indicated on the plans, with a minimum depth to allow a minimum cover of 36 inches over the top of the pipe, unless otherwise noted.

Trench Length. The trench length excavated in advance of pipe laying will be kept to a minimum. All unattended trench shall be covered with approved traffic plates or fenced with an approved 5-foot-high chain-link fence and clearly marked and delineated.

Trenching in Paved Areas. Prior to trench excavation through pavement, straight vertical trim lines will be cut in order to minimize breaking or cracking the remaining surface.

3.2 BACKFILLING AND COMPACTION

Backfill Material. Native material meeting the specified size and shape requirements (R value, swell pressure, sand equivalent, etc.) and free from wood waste or other extraneous or objectionable materials may be used for trench backfill material.

Pipe Bedding. Bedding material will consist of clean, granular, well-graded screened or crushed sand and gravel or native material free of stones and conforming to the specified gradation when tested in accordance with American Society of Testing and Materials (ASTM) D422. Pipe bedding and backfill to 6 inches over the crown of the pipe will be completed before backfilling operations are started.

Compaction Requirements. Pipe bedding zone will be compacted to 90 percent of maximum density. Trench backfill will be mechanically compacted to 90 percent of maximum density, except for trenches over 8 feet in depth. For trenches over 8-feet deep, backfill at depth over 4 feet may be compacted by either water settling or mechanical compaction. The top 4 feet of the trench line will be mechanically compacted to 90 percent.

3.3 PAVING

Asphaltic Concrete. Asphaltic concrete paving mix will comply with California Department of Transportation (Caltrans) Standard Specifications, Section 39, Type B. Asphalt trench patch will match or exceed existing asphalt thickness and will have a 6-inch minimum crushed aggregate base.

3.4 TEMPORARY CONTROLS

Construction Cleaning. The Contractor will keep the work site and other areas used in a neat and clean condition, and free from any accumulation of rubbish.

Air Pollution Control. The Contractor will, as often as necessary, prevent dust production in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity.

Sanitary Provisions. The Contractor will provide and maintain in a neat and sanitary condition such accommodations for employee use.

Provision for Water Courses. The Contractor will:

- Provide for the flow of all water courses, sewers or drains, intercepted or disturbed by the Contractor during work progress.
- Replace the same in as good condition as found or make such final provisions for them as necessary.
- Not obstruct the gutter of any street, and will use all proper measures to provide for the free passage of surface water.
- Make provisions to take care of all work-related surplus water, mud, silt, or other runoff and will be responsible for any damage resulting from his failure to provide such.

Archaeological or Cultural Resources. In the event that any archaeological or cultural resources are uncovered during the course of construction, all work will cease until an inspection and evaluation of the site has been made by an archaeologist to ensure that archaeological data are properly preserved. The Contractor will notify the Engineer who will in turn notify the proper authorities.

Maintenance of Traffic. The Contractor will conduct work so as to interfere as little as possible with public travel, and will provide and maintain suitable bridges, detours, or other temporary facilities to accommodate public or private travel including mail delivery, and will give reasonable notice to the owners of private drives before interfering with them.

Noise Control. Unless otherwise authorized by the Engineer, construction operations shall be restricted to the hours between 7:00 a.m. and 7:00 p.m.

3.5 TESTING

Compaction Testing. Quality control monitoring of subgrade backfill and embankment materials and construction will be performed by a certified independent laboratory. In-place density testing will be in accordance with ASTM D1557 or ASTM D2922. The moisture density standards will be ASTM D1557 or AASHTO T-180.

Pressure Testing. Hydrostatic pressure test will consist of maintaining a pressure of 225 pounds per square inch (psi) continuously for a period of at least 2 hours. Leakage rate for pipe will not exceed 10 gallons per inch diameter per mile of pipe per 24 hours. Measurement of leakage will be by the positive displacement measurement of water pumped out of an open container after the pipeline test pressure has been obtained and stabilized, or through the use of a City-supplied meter.

Disinfection and Bacteriological Tests. Final flushing, disinfecting, and bacteriological tests of water pipe will conform to American Water Works Association (AWWA) C651 guidelines. City personnel will perform water sampling and bacteriological testing.

4.0 TECHNICAL SPECIFICATIONS

4.1 MATERIAL SPECIFICATION

The city is providing the material for this pipeline project. The specifications to which the material will conform are provided in Appendix B.

4.2 INSTALLATION SPECIFICATION

The following sections are adapted from the City's standard technical specifications and will be included as the project Technical Specifications. Full technical specifications are included under separate cover.

GENERAL REQUIREMENTS - SECTION 1

1. General
1.1 Definitions
1.2 Conditions
1.3 Acceptability of Methods and Materials
1.4 Cal-OSHA Safety Code
1.5 Public Convenience Requirements
1.6 Public Safety Requirements
1.7 Defective Work or Materials
1.8 Protection of Existing Improvements
1.9 Proximity to Sewers
1.10 As-Built Drawings

PAVEMENT REMOVAL - SECTION 2

1. General
1.1 Scope of Work
1.2 Reference Specifications
2. Products
2.1 Materials
3. Execution
3.1 Layout and Alignment and Commitment
3.2 Asphalt Removal
3.3 Concrete Removal and Pavement
3.4 Maintenance

EXCAVATION, TRENCHING, AND BACKFILL - SECTION 3

1. General
1.1 Excavation and Trenching
1.2 Unstable Soil Conditions
1.3 Backfill
1.4 Non-Compatible Soils
1.5 Pavement Replacement

5.0 DETAILED DRAWINGS

5.1 PIPELINE DRAWING LIST

Detailed drawings are provided for the transmission pipeline from Well No. 1 near Kendall Drive to the North Plant. The following drawings are provided in a separate package with the specifications.

Drawing No.	Sheet Title
00	Cover Sheet
01	Location Maps and General Notes
02	Index Map
03	Plan and Profile
04	Plan and Profile
05	Miscellaneous Details
06	Miscellaneous Details
07	4" Force Main Waste Line
08	Details

5.2 MOOSE LODGE GRADING PLAN

Drawing No.	Sheet Title
01	Site Drainage Improvements

6.0 CONSTRUCTION COST ESTIMATE

Table 6.1

PIPELINE COST ESTIMATE

Item No.	Description	Unit	Estimate Quantity	Engineer's Estimate	
				Unit Price	Total
1	Mobilization	LS	1	$7,368.00	$6,760.00
2	Connection to Existing System	EA	1	$3,500.00	3,500.00
3	Connection to Extraction Well Piping	EA	3	$1,500.00	4,500.00
4	4-Inch PVC (1)	LF	486	$25.00	$12,150.00
5	12-Inch DIP (1)	LF	706	$45.00	31,770.00
6	16-Inch DIP(1)	LF	1079	$60.00	64,740.00
7	12-Inch Gate Valve	EA	6	$1,200.00	$7,200.00
8	Combination Air Valve Assembly	EA	2	$2,500.00	$5,000.00
9	Blow-Off Assembly	EA	2	$2,500.00	$5,000.00
10	Bridge Crossing	LS	1	$3,000.00	$3,000.00
11	Install Channel Crossing	LS	1	$7,500.00	$7,500.00
12	Air GAP/Sewer Connection	LS	1	$7,000.00	$7,000.00
13	Soils Compaction Testing	LS	1	$3,500.00	$3,500.00
	Construction Cost				$161,620.00
	Contingency @ 10%				$16,160.00
	Total Construction Cost				$177,780.00

Abbreviations: LS Lump Sum; LF Lineal Feet; EA Each; DIP Ductile Iron Pipe

Notes: (1) 4-, 12- and 16-inch pipe installed, complete, including pipe materials, fittings, excavation, bedding, fill material, export of unsuitable material, pavement repair, restoration of property, and all necessary work for a complete product.

Table 6.2
CONSTRUCTION COST ESTIMATE
MOOSE LODGE GRADING AND DRAINAGE IMPROVEMENTS

Item No.	Description	Unit	Estimate Quantity	Engineer's Estimate	
				Unit Price	Total
1	Mobilization	LS	1		$1,250.00
2	Demolition				
3	Curb & Gutter	LF	265	$3.28	$870.00
4	Pavement	SY	1070	$0.40	$430.00
5	Off-site Disposal	CY	150	$15.00	$2,250.00
6	Sawcut Exist Paving	LF	250	$1.40	$350.00
7	Asphalt Paving w/Aggregate Base	SY	1070	$9.25	$9,900.00
8	Type "A" C&G	LF	75	$7.45	$560.00
9	Type "B" C&G	LF	190	$12.10	$2,300.00
10	Curb Inlet	EA	1	$1,700.00	$1,700.00
11	CMP	LF	7	$25.00	$180.00
12	Canal Penetration	LS	1	$1,000.00	$1,000.00
13	Kaiser Slag Swale	SF	550	$3.85	$2,120.00
14	Compaction Testing	EA	10	$75.00	$750.00
	Construction Cost				$23,660.00
	Contingency @ 10%				$2,370.00
	Total Construction Cost				$26,030.00

Abbreviations:

LS	Lump Sum	LF	Lineal Feet
EA	Each	DIP	Ductile Iron Pipe
C&G	Curb & Gutter	CMP	Corrugated Metal Pipe
CY	Cubic Yard	SY	Square Yard

7.0 OPERATION AND MAINTENANCE MANUAL

The Operation and Maintenance (O&M) Manual will provide information of transmission pipeline and connected equipment O&M. The O&M manual will include pipeline description, valve schedule, and maintenance schedule. Because a majority of this information comes from the equipment supplier upon delivery, an O&M manual has not been developed at this time. Following final system component selection, and prior to system operation, a draft O&M manual will be prepared. The probable outline for this document is presented below.

1.0 Introduction
- 1.1 Project Description

2.0 Components
- 2.1 Pipe
- 2.2 Valves

3.0 Operating Procedures
- 3.1 Initial Filling and Testing
- 3.2 Routine Maintenance
  - 3.2.1 Valve exercise program
  - 3.2.2 Flushing
  - 3.2.3 Repair servicing

Appendices:

Equipment Specifications and O&M Manuals

8.0 BIBLIOGRAPHY

URS Consultants, Inc. 1995a. Newmark Wellfield Extraction System Technical Memorandum. Newmark Operable Unit Remedial Design. March.

—. 1995b. 60 Percent Design Submittal, Newmark OU Remedial Design Newmark Groundwater Contamination Superfund Site, North Plant.

APPENDIX A

Design Calculations

URS Consultants, Inc.

Sheet No. 1/1
Calc No.
Rev. No. 0

Job no. [illegible] Job [illegible]
Client EPA
Subject Air & Vacuum Valve Sizing for [illegible] Plant Pipe

By [illegible] Date 5-6-97
Chk'd [illegible] Date 5/6/97

Φ - 12" Pipe

$Q = 1000 \text{ gpm} \times (1.1)$ ← 10% additional flow

$= \frac{1000 \times 1.1}{449} = 2.45 \text{ cfs}$

Collapsing Pressure $P = 12\,500{,}000 \left(\frac{T}{D}\right)^3$ (P in psi; T, D in inches)
(from APCO Valve Catalog 726, 1990)

$= 12\,500\,000 \times \left(\frac{0.3}{12}\right)^3$

$= 195.3 \text{ psi}$ ∴ use 5 psi

⟹ Select 1" Air & Vacuum Valve (APCO)

Φ - 16" Pipe

$Q = (1000 + 1300) \times 1.1 \text{ gpm}$
$= 5.63 \text{ cfs}$

⟹ Select 2" Air & Vacuum Valve (APCO).

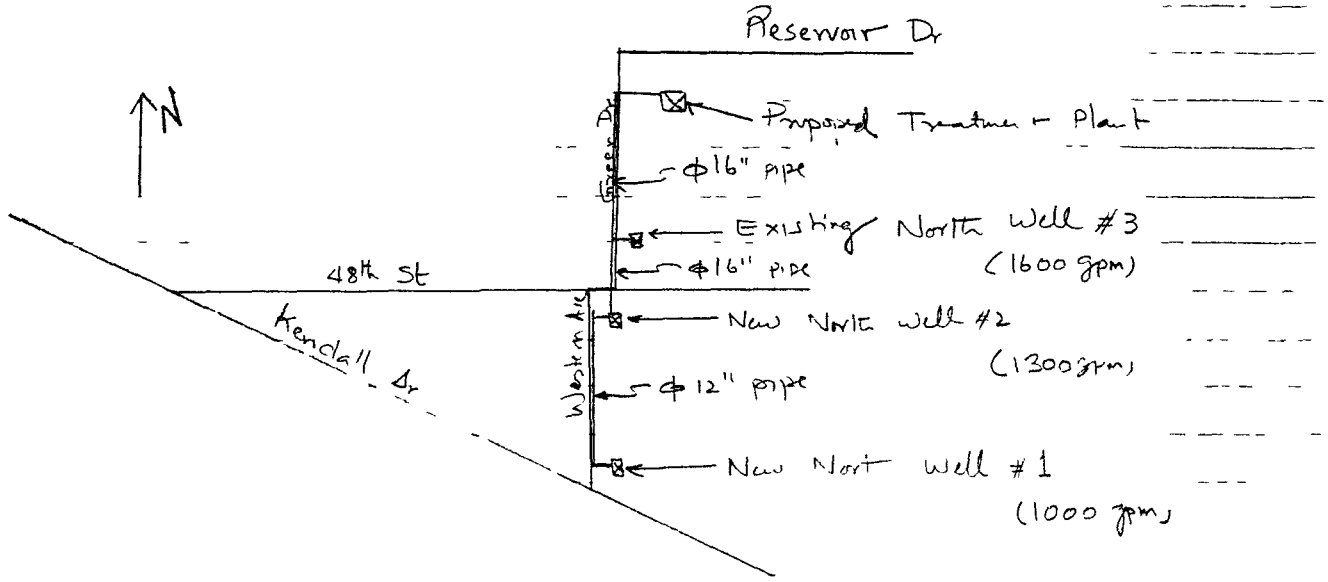
$Q = (1000 + 1300 + 1600) \times 1.1 \text{ gpm}$
$= 9.55 \text{ cfs}$

⟹ Select 2" Air & Vacuum Valve (APCO)

URS Consultants, Inc.

Sheet No. 1 -
Calc No.
Rev. No. 0
By IN Date 5-6-97
Chk'd — Date —/6/97

Job no. 41-62370 50 Job N.W. - North
Client EPA
Subject Pipe Sizing — North Plant



North Wells, Pipeline and Treatment Plant

In φ-12" (DI Pipe - Class 50)

$Q = 1000 \times 1.1$ gpm (10% addtn. allowance) $= 1100$ gpm

From DI Pipe Hand Book, φ12", pipe thickness = 0.31" OD = 13.20"

$\therefore$ ID $= 13.20 - 2 \times 0.31 = 12.58$"

Velocity in Pipe:

$$V = \frac{Q}{\pi D^2/4} = \frac{1000 \times 1.1 \text{ gpm} \times (0.13368 \times \frac{1}{60}) \text{ ft}^3/\text{gallon} \cdot \text{m/s}}{\frac{\pi}{4}\left(\frac{12.58}{12}\right)^2 \text{ ft}^2} = 2.84 \text{ ft/s}$$

Head Loss in Pipe:

$$H = 1.044 \times \frac{Q^{1.85}}{C^{1.85} D^{4.8655}}$$

(Hazen-Williams Formula)

Q — gpm
D — inch
H — head loss in ft per 1 foot long pipe
C = 120

$\Rightarrow H = 2.81 \times 10^{-3}$ ft

$\therefore$ Head Loss Per 1000 ft Pipe = 2.81 ft

URS Consultants, Inc.

Sheet No. 2

Calc No.

Job no. 41-62370 S0 Job [illegible]

Rev. No. 0

Client [illegible]

By [illegible] Date 5-6-97

Subject [illegible]

Chk'd [illegible] Date [illegible]/97

For ϕ-16" (DI Pipe - Class 50)

I $Q = (1000 + 1300) \times 1.1$ gpm (10% additional Capacity)

From DI Pipe Hand Book, ϕ16" : pipe thickness = 0.34" OD = 17.40"

$\therefore$ ID = 17.40 − 2×0.34 = 16.72"

$$v = \frac{(2300 \times 1.1) \times (0.13368 \times \frac{1}{60})}{\frac{\pi}{4} \times (\frac{16.72}{12})^2} = \underline{3.70 \text{ ft/s}}$$

$$H = 10.44 \times \frac{(2300 \times 1.1)^{1.85}}{120^{1.85} \times (16.72)^{4.8655}} = 3.28 \times 10^{-3} \text{ ft / 1 foot-pipe}$$

$\therefore$ Head loss per 1000 ft pipe = 3.28 ft

II $Q = (1000 + 1300 + 1600) \times 1.1$ gpm (10% additional flow)

$$v = \frac{(3900 \times 1.1) \times (0.13368 \times \frac{1}{60})}{\frac{\pi}{4} \times (\frac{16.72}{12})^2} = \underline{6.27 \text{ ft/s}}$$

$$H = 10.44 \times \frac{(3900 \times 1.1)^{1.85}}{120^{1.85} \times (16.72)^{4.8655}} = 8.72 \times 10^{-3} \text{ ft / 1 foot-pipe}$$

$\therefore$ Head loss per 1000 ft pipe = 8.72 ft

APPENDIX B

TYPICAL MATERIAL SPECIFICATIONS

SECTION 15062

DUCTILE IRON PIPE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Ductile iron piping, 3" and larger, complete with all fittings, encasement, and other necessary appurtenances.

1.02 REFERENCES

A. ANSI A21.10 - Gray-Iron and Ductile-Iron Fittings, 3" through 48", for Water and Other Liquids.

B. ANSI A21.51 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds.

C. ANSI B16.1 - Cast Iron Pipe and Flanges and Flanged Fittings, 25, 125, 250 and 800 lb.

D. AWWA C600 - Installation of Gray and Ductile Cast-Iron Water Main and Appurtenances.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe:

1. Ductile iron: ANSI A21.51; as listed below except as otherwise specified or indicated on drawings.

a. Where fitted with push on joints or mechanical joints: Minimum Class 50.

b. Where fitted with flanged, grooved, or grooved restrained joints: Class 53.

B. Fittings:

1. ANSI A21.10.

C. Joints:

1. Mechanical joints: ANSI A21.11.

2. Mechanical joints with tie rods:

   a. Tie rods: ASTM A307.
   b. Steel pipe spacers: ANSI A120, standard weight.
   c. Washers: ANSI A27.2 plain steel.
   d. Plastic plugs: As recommended by pipe manufacturer.

3. Flanged joints:

   a. Flanges:

      1. General use: ANSI A21.15 and ANSI B16.1, 125 lb.
      2. Where 250 lb indicated on drawings or specified: ANSI B16.1, 250 lb, flat faced.

   b. Bolts: ASTM A307, ANSI B18.1, chamfered or rounded ends projecting 1/4" to 1/2" beyond outer face of nut.

   c. Nuts: ASTM A307, hexagonal, ANSI B18.2, heavy semi-finished pattern.

   d. Gaskets: ASTM D1330, Grade I, red rubber, ring type.

4. Push-on joints: ANSI A21.11, except gaskets shall be neoprene or other synthetic rubber. Natural rubber will not be acceptable.

   a. Lubricant: Heavy vegetable soap solution suitable for potable water use.

5. Restrained joints:

   a. EBAA iron, Mega-Lug; U.S. Pipe "TR-Flex."

6. Threaded connections: ANSI B2.1, NPT; provide boss or tapping saddle wherever wall thickness at tapped connection is less than minimum length of thread, L_1, as defined in Table 2.

7. Mechanical couplings: Dresser "Style 38," Rockwell "411," or equal.

8. Grooved couplings:

   a. Standard groove.

   b. 24" and smaller:

      1) Pipe ends: Grooved with "radius groove."
      2) Couplings: Victaulic "Style 31," Gustin-Bacon "Series 100 Gruvagrip," or equal.

c. 30" and larger:

1) Pipe ends: Shouldered.
2) Couplings: Victaulic "Style 41," Gustin-Bacon "Series 100 Gruvagrip," or equal.

d. Gaskets: Compatible with pipe material.

9. Flanged coupling adapters:

a. 12" and under: Rockwell "Type 912," Dresser "Style 127," or equal.

b. 14" and over: Rockwell "Type 913," Dresser "Style 128" with anchor studs, or equal.

10. Wall castings: Mechanical joint with tapped holes for follower bolts and plastic plugs or prevent holes from filling with concrete.

11. Tapping saddles: Ductile iron with galvanized steel straps and rubber sealing gasket, 250 psi pressure rating.

D. Corrosion Control:

1. Shop coating and lining:

a. Cement lining: ANSI A21.4.

b. Shop primer: Mobile "13-R-50 Chromox Q.D. Primer," Tnemec "77 Chem-Prime," or equal.

c. Rust preventive compound: Houghton "Rust Veto 344," Rust-Oleum "R-9," or equal.

d. Bituminous coating: Manufacturer's standard.

2.02 FABRICATION AND MANUFACTURE

A. Joints:

1. Except as indicated on drawings:

a. Buried locations: Mechanical.

b. Bells in wall pipe or casting: Mechanical with tapped holes for follower bolts.

c. Bells in structures: Mechanical joint type.

d. Exposed: Flanged.

2. 12" and smaller branch outlets where main line is at least twice the diameter of the branch; tee or a tapping saddle is acceptable.

3. Where restrained joint with groove or grooved couplings are required increase pipe thickness to provide.

   a. Buried: 0.29" minimum at bottom of groove.

   b. All others: 0.25" minimum at bottom of groove.

4. Where tie rods are required, except as indicated on drawings provide:

   a. 10" and below: 2 rods.
   b. 14" and 12": 4 rods.
   c. 16" through 20": 8 rods.
   d. 24" through 30": 12 rods.

5. Mark the centerline of each flange and mechanical joint piece.

6. Screw flanges onto screwed-on flanged pipe so that pipe extends completely through and flush with the flange.

7. Finish machine pipe ends and flange faces flat and perpendicular to pipe centerline inn a single operation.

B. Shop coating and lining:

1. Cement line the interior surfaces of all pipe except where used for gas service.

2. Cement line the interior surfaces of fittings 14" and larger.

3. Shop prime exterior surfaces of pipe and fittings to be installed in exposed interior locations.

4. Shop coat flange faces with rust preventive compound.

5. Shop coat all other surfaces of pipe and fittings with a bituminous coating.

SECTION 15410

PLUMBING PIPING, VALVES AND APPURTENANCES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe and pipe fittings.

B. Valves.

C. Domestic water piping system.

1.02 REFERENCES

A. AWWA C200 - Steel Water Pipe 6 inches and Larger.

B. AWWA C207 - Steel Pipe Flanges for Waterworks Services--Sizes 4 inches through 144 inches.

C. AWWA C504 - Rubber-Seated Butterfly Valves.

D. AWWA C500 - Gate Valves.

E. AWWA C507 - Ball Valve 6" Through 48".

F. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

G. ASTM A234/A234M - Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.

H. ASTM A307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile.

I. ASTM D1330 - Rubber-Sheet Gaskets.

J. ANSI B1.1 - Unified Inch Screw Threads.

K. ANSI B16.5 - Pipe Flanges and Flanged Fittings.

L. ANSI B18.2 - Square and Hexagonal Nuts

M. ANSI B16.3 - Maleable Iron Threaded Fittings.

N. ASME Sec. 9 - Boiler & Pressure Vessel Code: Welding and Brazing Qualifications.

O. ASME B16.3 - Malleable Iron Threaded Fittings.

P. Uniform Plumbing Code.

Q. Steel Structures Painting Council Specifications.

R. ASTM A325 - Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.

S. ASTM D1785 - Polyvinyl Chloride (PVC) Plastic Pipe Schedule 40, 80, and 120.

T. AWWA C203 - Larger Coal Tar Protective Coatings and Linings for Enamel and Tape - Hot Applied.

U. ASSE - American Society of Sanitary Engineers Standards

V. ASTM D2464 - Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings Schedule 80.

W. ASTM D2467 - Socket Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings Schedule 80.

X. AWWA C508 - Swing Check Valves for Waterworks Services, 2-inch through 24-inch NPS.

PART 2 - PRODUCTS

2.01 STEEL PIPING (3 INCH AND LARGER PIPE)

A. Pipe: AWWA C200 (ASTM A53), Seamless, Type E or S, Grade B, Black, Standard Weight, cement mortar lined where specified.

B. Joints: Exposed; Forged Steel slip-on flanges conforming to ANSI B16.5 or weld neck flanges conforming to AWWA C207 or field butt welded as shown on the drawings; Buried; Field Butt Welded unless otherwise noted.

C. Fittings: Forged Steel, AWWA C200, or ASTM A234/A234M, Grade WPA unless otherwise noted, lining to match adjoining pipe.

D. Bolts: ASTM A307 bolts and nuts threaded in accordance with ANSI B1.1, dimensions in accordance with ANSI B18.2, heavy hexagonal, semi finished pattern.

E. Gaskets: ASTM D1330, Grade 1, Red Rubber, ring type, 1/8 inch thick (or compressed gasketing material consisting of organic fibers (Kevlar) and neoprene binder).

2.02 PVC PIPE

A. Chemical Service:

1. Pipe: ASTM D1785, Schedule 80, PVC 1120, with nSF seal.

2. Fittings: ASTM D2464 or D2467, PVC I; by pipe manufacturer or by Celanese, Chemtrol, or equal.

3. Expansion joints: Belmont "Style 3915," Resistoflex "Style R6905" molded expansion joint, or equal.

2.03 VALVES

A. Butterfly: AWWA C504, rubber seat, tight closing, wafer or flanged short body as indicated on drawings or in schedule. 175 psig maximum nonshock shutoff pressure Supplied with handle and readily locked in the open, closed and not less than five intermediate positions. Ends flanged, drilled and faced to match adjoining pipe.

B. Gate (≥3"): AWWA C500, iron body, bronze trim with non-rising stem, inside screw and handwheel for exposed service, or tee wrenches for buried service. Double disc, parallel seat for horizontal pipe runs, solid wedge for vertical pipe runs. Ends: push-on, flanged, or mechanical to match adjoining pipe.

2.04 JOINTS

A. Mechanical couplings:

1. Insulating: Dresser "Style 39," Rockwell "416," or equal.

2. Reducing: Dresser "Style 62," Rockwell "415," or equal.

3. Transition coupling: Dresser "62," Rockwell "413," or equal.

4. Others: Dresser "Style 38," Rockwell "411 Flexible Coupling," or equal.

B. Joint harness:

1. Bolts: ASTM A193, Grade B7, or Ryerson Stress-Proof, minimum yield point 100,000 psi.

a. Threading: ANSI B1.1, Class 2A fit, coarse thread series for 1" and smaller and 8-thread series for 1-1/8" and larger.

b. Ends: Chamfered or rounded.

2. Nuts: Hexagonal, ASTM A194, Grade 2H, or better.

a. Threading: As specified for bolts except Class 2B fit.

b. Dimensions: ANSI B18.2, heavy, semi-finished pattern.

3. Washers: Hardened steel, ASTM A325.

C. Flange coupling adapters:

1. 6" thru 12", Rockwell "912," Dresser "127," or equal.

2. 14" and larger: Rockwell "913," Dresser "128," with anchor studs, or equal.

D. Victaulic couplings: Victaulic "Style 22" or "77," unless otherwise noted.

E. Solvent welded:

a. Cut PVC pipe ends square and smooth and wipe clean.

b. Apply solvent cement to outside of the pipe and the inside of the fitting socket with a small brush.

c. Push the coated surface snugly together and rotate approximately ½ turn to insure uniform cement distribution.

d. Remove excess cement by wiping.

2.05 TRACER WIRE

A. Tracer wire shall be minimum #12 AWG stranded copper wire with THW rated insulation, color blue. It shall be mounted directly to the top of buried nonferrous pipes.